### **HABITAT CONDITIONS**



#### Dam and Hydropower Influences

Section 236.400 of the Missouri Revised Statutes defines a dam as "any artificial or manmade barrier which does or may impound water, and which impoundment has or may have a surface area of fifteen or more acres of water at the water storage elevation, or which is thirty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or dam, if it is not across a streambed or watercourse, together with appurtenant works" (MGA 2000a).

The Dam Safety Law of 1979 established a "Dam and Reservoir Safety Council" associated with the Missouri Department of Natural Resources (MDNR 2000f and MGA 2000a). The responsibility of this council is to "...carry out a state program of inspection of dams and reservoirs in accordance with regulations adopted by the council" (MGA 2000b). The MDNR Dam and Reservoir Safety Program operates under the guidance of the council. The program is responsible for regulating all new and existing non-federal, non-agricultural dams which have a height of 35 feet or greater in order to ensure that these structures meet minimum safety standards. In order to facilitate this, the program maintains a database on over 4,000 dams within the state to be used by private owners, professional engineers, mining companies, emergency management officials, educational institutions, other government agencies as well as private individuals (MDNR 2000g). This database includes permitted dams as well as some dams which don't require a permit.

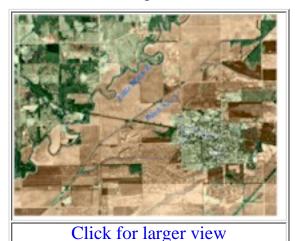
Within the Current River Watershed there are currently 29 dams which have records within the Dam and Reservoir Safety Program Database (<u>Figure Hc01</u>) (MDNR 2000h). All are reinforced earth structures with heights ranging from 5 to 73 feet. Impoundment areas range from 3 to 121 acres.

In an effort to further determine the presence of significant dam and reservoir structures within the watershed, analysis was performed on National Wetlands Inventory (NWI) GIS data for the watershed. Data was analyzed based on all diked/impounded waters within 100 feet of third order (Strahler) and larger stream segments. This method yielded 36 potentially significant diked/impounded sites. The largest of these sites was 26.1 acres; with the smallest being 0.08 acres (Table Hc01). It is estimated that 17 of these structures are in-stream, based on analysis of their spatial relationship to the 1:24,000 hydrography layer.

#### **Channel Alterations**

Alterations of stream channels by human activity can take several forms including channelization, channel constriction through bridge construction, raising of the base level of the stream by improper construction of low-water bridges sand and gravel removal, etc. All of these activities can adversely affect stream habitat as well as water quality and thus the health of riparian and aquatic communities.

Channelization of a stream involves the straightening, deepening, and/or widening of the stream channel. Frequently, stream channels, in their natural states, have a complex morphology composed of meanders, riffles, and pools. The meanders of a stream help to dissipate the streams energy. A meandering stream also allows surface and ground water within a drainage to be released gradually relative to a straight stream thus allowing for better maintained base flows during dry periods. Channelizing can have several direct and indirect negative effects. These include shortening of the stream, increasing channel gradient of the channelized segment, loss of well defined riffles and pools, increased erosion including headcutting upstream of the channelized segment, increased deposition and flooding downstream of the channelized segment, lowering of the flood plain water table, and a loss of habitat diversity to name a few (Bolton and Shellberg 2001).



These impacts can spread to other streams within the respective watershed as well. The aforementioned impacts not only negatively effect aquatic habitats and biotic communities, but can also be damaging to property both up and downstream due to the potential for increased erosion and flooding in these areas respectively. Estimates based on analysis of National Wetlands Inventory data indicate that approximately 98 miles of channelized stream exist within the Current River Watershed (Figure Hc01). The majority of these streams are located in the southeastern corner of the watershed including many in the Little Black River Hydrologic Unit. Smaller channelization projects have probably occurred on private property and also from road and bridge construction elsewhere in the watershed.

Improper bridge design which alters the normal flow pattern of a stream can also negatively impact a stream. Bridges can restrict stream flow especially at high flows, reducing flow velocities upstream of the bridge, thus increasing sedimentation. They can also increase velocities downstream of the bridge, thus increasing scour/erosion. Improperly designed low-water bridges can alter the base level (that level below which a stream cannot erode) of a stream, thus altering the stream gradient. They can also act as a dam, backing up water behind them and increasing sedimentation on the upstream side. Improperly constructed low-water bridges can also act as a barrier to fish movement. According to the U.S. Corps of Engineers Regulatory Program Database, 8 permits were issued for culvert construction, bridge construction, bridge removal, or bridge replacement in the Current River Watershed between 1996 and 2000 (USACOE 2001) (Figure Hc01). It is important to note that no work type or location was entered in the database for some permits, so the actual number of permits related to bridge activity may be higher. According to the Missouri Department of Transportation Highway and Bridge Construction Schedule, there are currently (2001) four state highway projects which involve drainage and/or bridge construction or maintenance scheduled within the watershed from 2001-2003 (MDT 1998).

Gravel mining can also directly and indirectly contribute to channel alterations as well as water quality problems. The negative impacts of improper gravel mining have been shown to include channel deepening, sedimentation of downstream habitats, accelerated bank

erosion, channel shift, the lowering of the flood plain water table, and the formation of a wider and shallower channel which can result in increased temperature extremes (Roell 1999). Since 1984, there have been 42 permitted sand and gravel removal operation sites (including instream and pit operations) within the



Current River Watershed (MDNR 2001b). Figure Hc02 shows the general location and relative level of activity of permitted gravel mining within the watershed. Much of the permitted sand and gravel removal activity has occurred on the Lower Current River below Doniphan and on Big Creek. Other streams which have experienced activity on a lesser scale include Bean Creek, Gladden Creek, Pigeon Creek, Pike Creek, Mulberry Creek (flood plain), Barren Fork, Big Barren Creek, Hamilton Creek, and Swan Creek

Approximately 137 miles of streams within the Current River Watershed have seasonal restrictions placed on sand and gravel mining activities (Figure Hc02). Currently approximately 131 miles of the Current River are closed to sand and gravel mining from March 15 to June 15 (MDC 2000). This closing is based on the following criteria: "Designated Outstanding National or State Resource Waters as defined by the Missouri Department of Natural Resources when these waters support significant biological resources that may be impacted by sand and gravel excavation during periods of spawning, incubation, or rearing" (MDC 1997b). In addition, approximately 6 miles of Barren Fork (Sinking Creek.) are closed to sand and gravel mining from November 15 to February 15 (MDC 2000). The criteria for listing is the presence of "stream reaches which support seasonal concentrations of spawning, incubating, or rearing fishes or mussels of management interest" (MDC 1997b).

Many types of activities such as the filling of wetlands, placement of roadfills, construction of dams and the construction of cable or pipeline crossing, just to name a few, require permitting from the

COE when they involve "waters of the United States". In the 5 year period between 1996 and 2000, approximately 49 permits were issued by the COE for activities within the Current River Watershed (Figure Hc01) (USACOE 2001). The most common activity for which permits were issued was gravel removal. Additional information regarding the COE Regulatory Program, as well as activities requiring COE permits can be found at http://www.swl.usace.army.mil/regulatory/index.html.

#### Natural Features

The MDC inventoried counties within the Current River Watershed between 1986 and 1995 for unique natural features (Nigh 1988; Ryan and Smith 1991, Ryan 1993, and Rowan 1995). The inventories recognized seven categories of natural features: examples of undisturbed natural communities, habitat of rare or endangered species, habitat of relict species, outstanding geological formations, areas for nature studies, other unique features, and special aquatic areas having good water quality, flora, and fauna.

In tandem with the initial natural features inventories, the Missouri Natural Heritage Database (NHD) was created. The NHD lists many of the features which were included in the Missouri Natural Features Inventory. The database, which is updated frequently, is a dynamic representation of the occurrence of many natural features in Missouri. Currently the database contains 878 features for the Current River Watershed (MDC 2001b). These include 193 examples of 35 types of natural communities (Table Hc02). Dolomite glades are the most commonly recorded community of the watershed within the database accounting for 30 records. Fens are the second most commonly recorded community with 25 records. Table Hc03 lists 20 inventoried aquatic communities located within the Current River Watershed. These include examples of 4 types of aquatic communities including Ozark Creeks and Small Rivers, Ozark Headwater Streams, Ozark Oxbows and Sloughs, and Ozark Springs and Spring Branches.

A detailed description of the previously mentioned terrestrial natural communities can be found in <u>The Terrestrial Natural Communities of Missouri</u> by Nelson (1987), while a detailed description of Missouri's aquatic communities can be found in <u>Aquatic Community Classification System for Missouri</u> by Pflieger (1989).

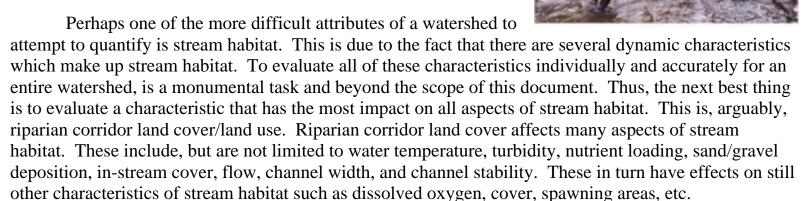
Undoubtedly more examples of natural features exist within the watershed. However, due to many circumstances including the limited access to private land and the large land area, many features may be as yet unrecorded. Therefore, the previous listing of features should not be regarded as final or comprehensive. However, this listing does provide a good cross section of the types of communities which can be found within the watershed.

### **Improvement Projects**

There are 8 stream improvement projects within the Current River Watershed (Gossett, personal communication and Mayers, personal communication). Most of these have focused on stream bank

stabilization and riparian revegetation. However two projects include in-stream habitat improvement primarily through the placement and anchoring of boulders and/or rootwads in the stream. The most extensive of these habitat projects is located within Montauk State Park. Table Hc04 lists stream improvement projects in the watershed.

#### Stream Habitat Assessment



Evaluation of riparian corridor land cover/land use within the Current River Watershed was accomplished using Missouri Resource Assessment Partnership Land Cover Data. A buffer zone 3 pixels (90 meters) wide was created which corresponded to a 1:24,000 hydrography coverage for the watershed. This was split into segments no longer than 0.25 miles long (Caldwell, personal communication). Percent land use for each segment was then calculated. Land cover/land use categories included forest, wetland, grassland, cropland, urban, and water. Percentages of these categories were then calculated for riparian corridors within each drainage unit as well as for the whole watershed.

Results from the Current River Watershed indicate that riparian corridor land cover consists of more forest/wetland (78.9%) than grassland/cropland (20.2%). Percentages for the remaining categories of urban and water are 0.1% and 0.7% respectively. Of the 8 eleven digit hydrologic units within the watershed, the Current River-Sinking Creek Unit has the highest combined percentage of forest/wetland corridor land cover/land use at 92.0%. It also ranks as having the second lowest combined percentage of grassland/cropland corridor land use at 7.7%. <u>Table Hc05</u> gives riparian corridor land cover/land use percentages for all eleven digit hydrologic units within the watershed as well as percentages for the total watershed. <u>Figure Hc03</u> presents a graphic representation of riparian corridor land cover/land use for all drainage units within the watershed.

In addition to analysis of riparian corridor within hydrologic units, riparian corridor land cover/land use was analyzed for all fourth order (Horton) and larger streams within the watershed in order to determine those specific streams having a substantial amount of unforested riparian corridor. Analysis was based on stream miles as well as percentage of total stream miles with combined grassland, cropland, and urban categories equal to or exceeding 25% of total riparian land cover use (referred to as non forested for the purposes of this document) (Table Hc06 and Figure Hc04). Results indicate that the Little Black River has the highest percentage of stream miles (fourth order streams) with non-forested riparian corridor at 60.9% (32.2 miles). Two streams within the watershed have no stream miles with non-forested corridor equal to or greater than 25%. These are Cedar Creek and Brushy Creek. An estimated 13.7% (19.4 miles) of the Current River riparian corridor is non-forested.

An aerial stream survey of selected streams in the Current River Watershed was conducted in March, 1992. The survey included portions of Mill Creek, Rogers Creek, Sinking Creek, and Barren Fork. In 1993, another aerial survey was conducted on Current River from Two Rivers to Van Buren in order to document flooding. Both surveys included video of selected streams and still photographs of selected sites. Information from these surveys will be useful for a variety of projects such as future habitat assessment, assisting landowners with problems associated with stream bank erosion and deposition, reviewing gravel mining permits, selection of aquatic biota sampling sites, etc.

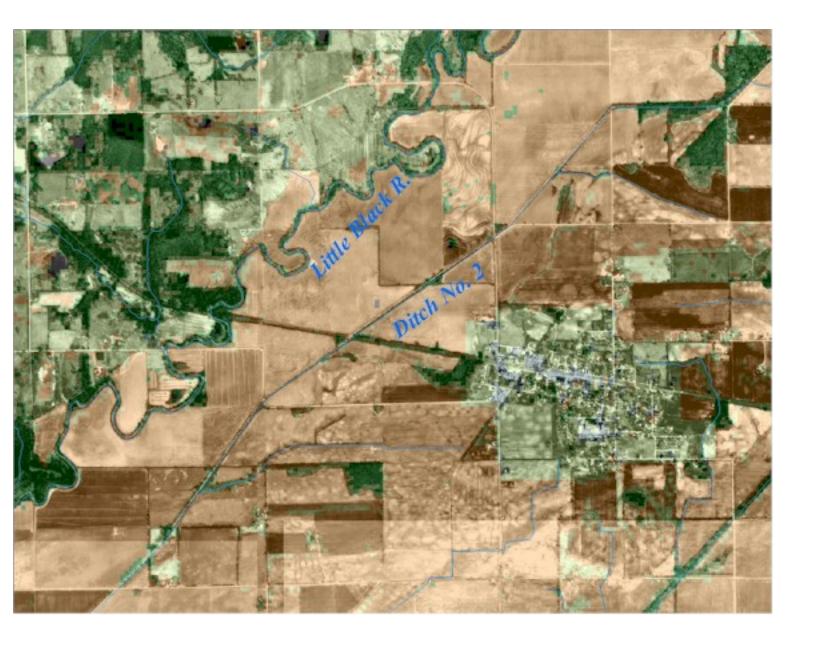


Figure Hc01

# Current River Watershed Impoundments and Channel Alterations

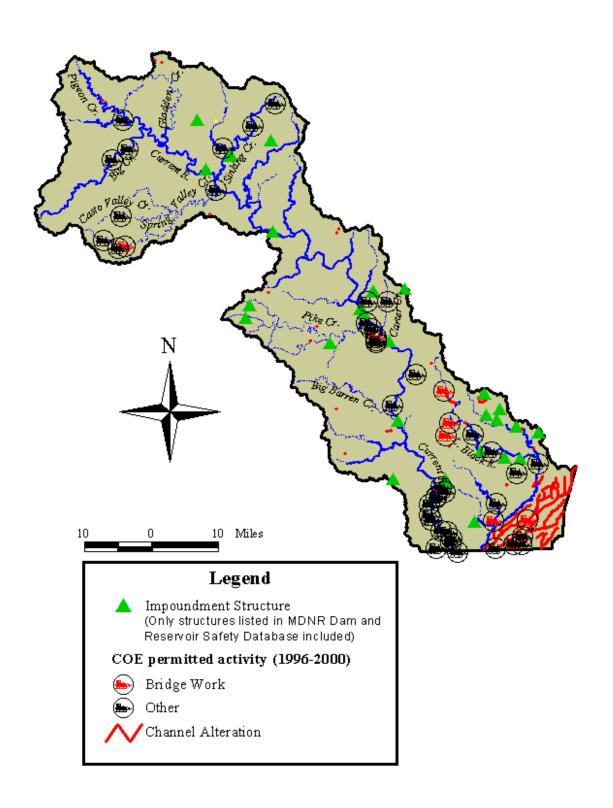
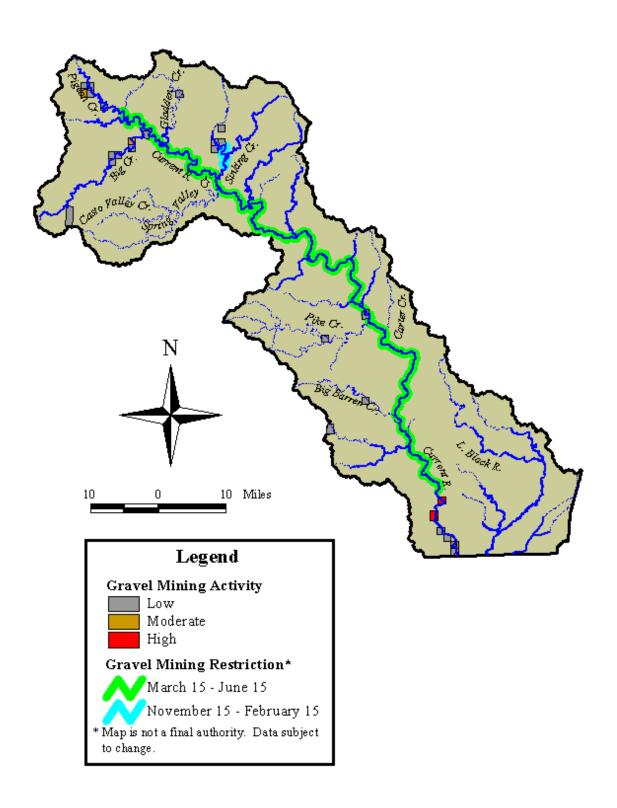
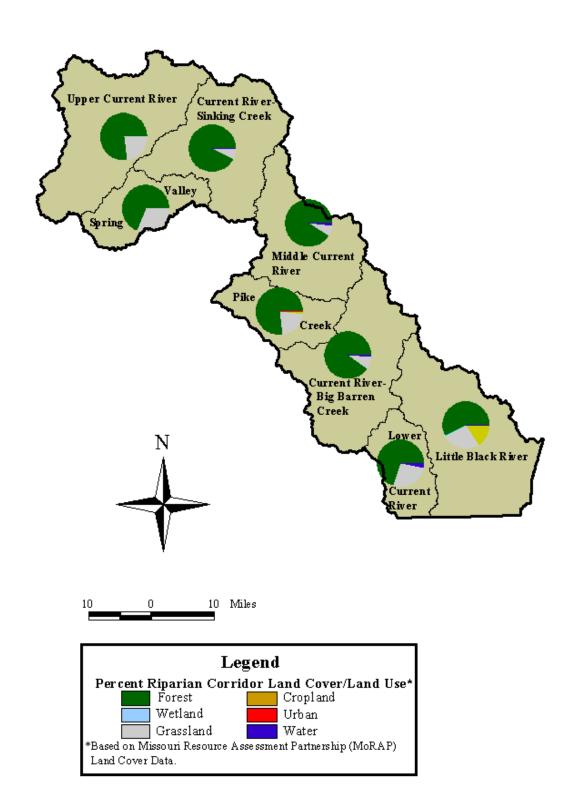


Figure Hc02.

### Current River Watershed Gravel Mining Activity



Current River Watershed
Eleven Digit Hydrologic Unit
Riparian Corridor Land Cover



Current River Watershed
Riparian Corridor Land Cover of
Fourth Order and Larger Streams

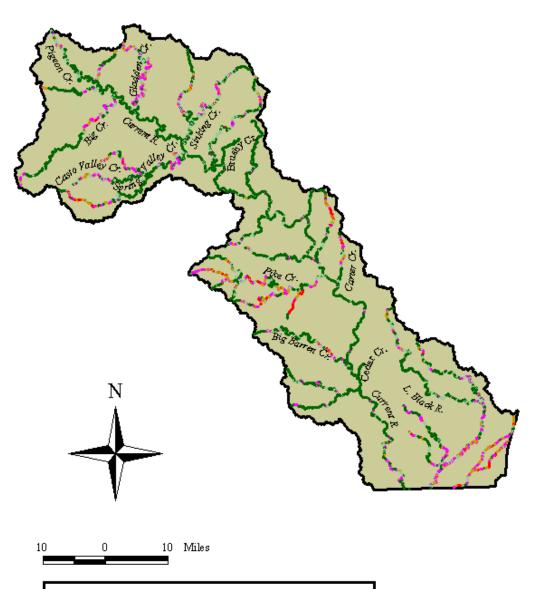




Table Hc01. Diked/impounded wetlands within 100 feet of third order or larger (strahler) stream segment within the Current River Watershed based on analysis of National Wetlands Inventory (NWI) Data.

Stream Name	Impoundment Size (Acres)	Instream
Trib to CRW013	0.527	Yes
Trib to PineValley Cr.	1.319	Yes
Trib to Current River.	2.843	No
Barren Fork	0.099	No
Barren Fork	0.574	Yes
Barren Fork	0.110	No
Beaverdam Creek	0.835	Yes
Beaverdam Creek	3.859	Yes
Big Creek	0.249	Yes
Carter Creek	0.603	No
Case Bolt Branch	1.036	No
CRW006	1.123	Yes
CRW012	0.093	No
CRW012	8.866	Yes
CRW012	0.182	No
Current River	3.187	Yes
Deep Pond Hollow	0.083	No
Deep Pond Hollow	0.193	No
Dooley Hollow	0.281	Yes
Dry Valley	0.113	No
Glaze Creek	0.515	No
Little Black River	0.204	No
Little Sinking Creek	0.295	No
Little Barren Creek	0.212	No
Matthews Branch	26.097	Yes
North Prong Beaverdam Creek	7.220	Yes
North Fork Buffalo Creek	0.094	No
Pike Creek	0.179	No
Schafer Spring	0.604	Yes
Schafer Spring	1.093	Yes
Sinking Creek	0.079	No
Sinking Creek	2.076	No
South Fork Little Barren Creek	1.006	Yes
South Ashley Creek	0.150	No
Sugar Tree Grove Spring	0.444	Yes
Welch Spring	0.247	Yes

# Table Hc02. Inventoried natural communities within the Current River Watershed (MDC 2001b).

Community	Number of Records in Watershed
Acid Seep	1
Caves	18
Creeks and Small Rivers (Ozark)	3
Deep Muck Fen	11
Dolomite Glade	30
Dry Chert Forest	6
Dry Igneous Cliff	1
Dry Limestone/Dolomite Cliff	2
Dry Limestone/Dolomite Forest	1
Dry-Mesic Bottomland Forest	1
Dry-Mesic Chert Forest	8
Dry-Mesic Forest	1
Dry-Mesic Igneous Forest	4
Dry-Mesic Limestone/Dolomite Forest	2
Effluent Cave	3
Fen	25
Flatwoods	4
Forested Acid Seep	1
Forested Fen	3
Headwater Streams (Ozark)	5
Igneous Glade	9
Mesic Bottomland Forest	6
Mesic Limestone/Dolomite Forest	1
Mesic Sand Forest	1
Moist Limestone Dolomite Cliff	1
Oxbows & Sloughs (Ozark)	7
Pond Marsh	5
Pond Shrub Swamp	10
Pond Swamp	2
Prairie Fen	4
Springs and Spring Branches (Ozark)	6
Wet Bottomland Forest	1
Wet-Mesic Bottomland Forest	4
Xeric Igneous Forest	3

## Table Hc03. Inventoried aquatic natural communities within the Current River Watershed (MDC 2001b)

Significance: S=Significant, E=Exceptional, N=Notable, ND=No Data

Aquatic Community Type	Name	Significance
Creeks and Small Rivers (Ozark)	Big Barren Creek Natural Area	S
Creeks and Small Rivers (Ozark)	Little Black River - Hwy 160	E
Creeks and Small Rivers (Ozark)	Mudpuppy Conservation Area - Little Black River	E
Headwater Streams (Ozark)	Barren Fork	E
Headwater Streams (Ozark)	Chilton Creek Preserve - Aurel Hollow, Rogers Creek	ND
Headwater Streams (Ozark)	Sinking Creek	E
Headwater Streams (Ozark)	Stegall Mountain Natural Area - Rogers Creek	S
Oxbows and Sloughs (Ozark)	Big Spring Slough	E
Oxbows and Sloughs (Ozark)	Dugan Hollow Slough	E
Oxbows and Sloughs (Ozark)	Hickory Hollow	E
Oxbows and Sloughs (Ozark)	Little Black River Oxbow	ND
Oxbows and Sloughs (Ozark)	Railroad Slough	E
Oxbows and Sloughs (Ozark)	Rocky Creek Conservation Area	E
Oxbows and Sloughs (Ozark)	Rogers Creek Slough	E
Springs and Spring Branches (Ozark)	Blue Spring Natural Area	S
Springs and Spring Branches (Ozark)	Medley Hollow	S
Springs and Spring Branches (Ozark)	Old Schoolhouse Hollow	E
Springs and Spring Branches (Ozark)	Pulltite Spring	ND
Springs and Spring Branches (Ozark)	Railroad Spring	N
Springs and Spring Branches (Ozark)	Rocky Creek Conservation Area	E

Significance: S=Significant, E=Exceptional, N=Notable, ND=No Data

Table Hc04. Stream improvement projects within the Current River Watershed (Gossett, personal communication and Mayers, personal communication).

Affected Stream	Project Type
<b>Current River-Baptist Access</b>	Cedar tree revetment, riparian planting, willow
	poles, and willow stakes
Current River-Tan Vat	Willow and Riparian Planting
Current River-Two Rivers	Willow Planting
Big Spring	Bio-revetment
<b>Current River-Big Spring Access</b>	Bio-revetment
Current River-Gooseneck	Willow and riparian planting
Current River-Montauk State Park	Cedar tree revetments, willow staking, boulder and
	rootwad placement.
Barren Fork	Willow wattles, rootwads

Table Hc05. Percent riparian corridor land cover for eleven digit hydrologic units within the Current River Watershed. Data is based on MoRAP Missouri Land Cover Data (1999) as analyzed by Caldwell (2001).

Unit Name	FOR	WET	GRS	CRP	URB	WAT
Upper Current R.	76.8	0.0	22.8	0.4	<0.1	<0.1
Spring Valley	68.9	0.0	30.8	<0.1	0.2	<0.1
Current RSinking Creek	92.0	0.0	7.3	0.4	<0.1	0.2
Middle Current R.	91.3	0.0	7.3	0.3	<0.1	1.1
Pike Cr.	77.7	0.0	20.9	0.7	0.7	0.9
Current RBig Barren Cr.	89.8	0.0	8.7	0.4	0.2	
Lower Current R.	70.3		26.7	<0.1	0.1	2.8
Little Black R.	57.5		25.6	14.8	<0.1	0.8
Current River Watershed	78.7	0.2	17.4	2.8	0.1	0.7

FOR = Forest, WET=Wetland, GRS=Grassland, CRP=Cropland, URB=Urban, WAT=Water

Table Hc06. Stream miles and percentage of total stream miles (in parenthesis) for fourth order (Horton) and larger streams with combined grassland, cropland, and urban (non-forested for the purposes of this document) land cover categories equaling 25% or greater of total riparian land cover/land use. Results given by order (Strahler) as well as total stream length. Data is based on 1:24,000 hydrography layer combined with Missouri Resource Assessment Partnership (MoRAP) Land Use/Land Cover Data (1997).

	Order							
Stream	1 <sup>st</sup>	2 <sup>nd</sup>	3rd	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	Total
Current R.				0.2	1.0	2.0	16.3	19.4
				(6.1)	(3.1)	(10.0)	(18.90	(13.7)
Little Black R.	0.3	3.9	0.9	6.5	19.2	1.5		32.2
	(100)	(99.6)	(100)	(38.9)	(82.9)	(96.3)		(60.9)
Indian Cr. Ditch		,	,	,	<u> </u>	<u>'</u>	]	No Data
Ditch No. 3				3.2	4.3			7.5
				(99.1)	(90.8)			(94.2)
Lateral No. 1	0.4			1.6				2.0
	(48.1)			(100)				(83.3)
Neelyville Ditch				0.8				0.8
				(77.9)				<b>(77.9)</b>
Logan Cr.	0.2	0.7	1.7	5.8				8.4
	(27.8)	(29.5)	(66.0)	(45.8)				(45.7)
Harris Cr.	1.2	0.6	1.9	2.4				6.1
	(77.0)	(100)	(35.8)	(60.5)				(54.0)
Beaverdam Cr.				6.6				6.6
				(57.4)				(57.4)
N.P. Little Black R.	0.0	1.4	2.7	3.2				7.3
	(0.0)	(75.1)	(54.5)	(25.6)				(35.9)
Buffalo Cr.					0.2			0.2
					(5.1)			(3.8)
S.F. Buffalo Cr.	0.2	0.5	0.0	0.6				1.3
	(22.9)	(62.7)	(0.0)	(12.2)				(11.9)
N.F. Buffalo Cr.	0.0	1.5	0.0	1.5				3.0
	(0.0)	(33.9)	(0.0)	(39.7)				(25.4)

Cedar Cr.		0.0	0.0	0.0			0.0
		( <b>0.0</b> )	( <b>0.0</b> )	( <b>0.0</b> )			
Big Barren Cr.	0.0	0.4	2.4	5.4			8.2
	(0.0)	(100)	(28.0)	(39.3)			(33.6)
Carter Cr.	0.0	0.8	1.3	3.1			5.2
	(0.0)	(100)	(100)	(48.9)			(57.8)
Pike Cr.	1.2	0.4	2.7	2.8	19.4		26.5
	(82.7)	(92.8)	(99.3)	(100)	(63.3)		(69.7)
Dry Valley		0.5	2.3	2.0	`		4.8
	0.0	(99.2)	(99.5)	(99.5)			(86.4)
Little Pike Cr.	0.0	0.2	0.1	7.5			7.8
	(0.0)	(9.5)	(23.1)	(85.5)			(67.7)
Deep Pond Hol.	<0.1		0.7	1.4			2.1)
<del>-</del>	(12.0)	0.0	(73.4)	(59.3)			(43.0)
Sycamore Cr.	0.0	0.0	0.0	3.0			3.0
	(0.0)	(0.0)	(0.0)	(61.9)			(37.2)
Seaman Cr.	0.0	0.0	0.3	1.1			1.3
		(0.0)					1 1
Pine Valley Cr.	(0.0)	2.4	(29.8) 1.9	(100)			(40.6) 7.8
I me vancy cr.							1 1
M:II C	(0.0)	(72.9)	(0.0)	(40.7)			$\begin{array}{ c c } \hline (52.7) \\ \hline \hline \end{array}$
Mill Cr.	0.5	0.7	2.0	0.7			3.9
	(49.5)	(49.9)	(21.2)	(27.2)			(27.1)
Paint Rock Cr.	0.0	0.0	0.2	0.0			0.2
	(0.0)	(0.0)	(6.7)	( <b>0.0</b> )			(3.9)
Blair Cr.	0.0	0.0	0.0	1.0			1.0
	(0.0)	(0.0)	(0.0)	(7.7)			(5.3)
Brushy Cr.	0.0	0.0	0.0	0.0			0.0
Big Cr.	0.7	0.0	3.3	8.9			12.9
	(54.7)	(0.0)	(49.5)	(46.0)			(46.5)
Spring Valley Cr.	<0.1	0.1	5.3	2.8	8.6		16.9
	(3.5)	(34.2)	(85.2)	(80.4)	(57.6)		(64.2)
Casto Valley Cr.	0.4		1.3	3.8	1.2		6.7
•		Į.	, i	l l	I	I	1

Black Valley Cr.			1.3	3.3		4.6
			(43.2)	(63.6)		(56.2)
Sinking Cr.	0.0	1.4	2.4	12.3	2.4	18.4
	(0.0)	(94.6)	(83.7)	(74.4)	(48.0)	(67.9)
Barren Fork	0.1	0.3	2.2	9.3		11.9
	(9.5)	(30.3)	(59.4)	(62.9)		(58.0)
Gordon Cr.	0.0	0.0	<0.1	1.3		1.3
	(0.0)	(0.0)	(4.5)	(60.7)		(24.7)
Gladden Cr.	1.0	<0.1	2.2	14.4		17.7
	(100)	(100)	(58.2)	(81.5)		(78.4)
Gladden Br.	1.0	1.3	2.8	2.0		7.1
	(100)	(90.7)	(66.9)	(85.8)		(79.4)
Big Cr.	0.6	1.0	0.1	12.3		13.9
	(100)	(100)	(6.9)	(41.7)		(43.3)
Ashley Cr.				1.8		1.8
				(60.9)		(60.9)
North Ashley Cr.	0.9		0.0	1.3		2.2
	(41.7)		(0.0)	(19.2)		(21.9)
Inman Hol.	0.0	0.0	0.5	2.8		3.3
	(0.0)	(0.0)	(24.4)	(80.6)		(50.2)